IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s):	Boer et al.
Case:	Boer 7-3-2-3
Serial No.:	10/562,618
Filing Date:	May 15, 2006
Group:	2617
Examiner:	Fred A. Casca
Title:	Method and Apparatus for Communicating Symbols in a Multiple Input Multiple Output Communication System Using Interleaved Subcarriers Across a Plurality of Antennas

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APPEAL BRIEF

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Commissioner for Patents
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Sir:

This Appeal Brief is submitted in response to the Office Action dated November 26, 2010 in the above-referenced application, in which the Examiner reopened prosecution in response to an Appeal Brief filed August 30, 2010. A request to reinstate the appeal is submitted herewith.

REAL PARTY IN INTEREST

The present application is assigned to Agere Systems Inc., as evidenced by an assignment recorded on May 10, 2006 in the United States Patent and Trademark Office at Reel 017607, Frame 0529. The assignee, Agere Systems Inc., is the real party in interest.

RELATED APPEALS AND INTERFERENCES

An Appeal Brief was submitted on August 6, 2009 for related United States Patent Application Serial No. 10/562,619 and a Notice of Appeal was submitted on February 1, 2011.

STATUS OF CLAIMS

The present application was filed on May 15, 2006 with claims 1 through 34. Claims 1 through 34 are presently pending in the above-identified patent application. Claims 1-7, 11-16 and 21-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Applicant's Background Disclosure in the Specification, particularly Figures 1-3 and page 4, line 18 through page 5, line 19 (Admitted Art) in view of Shattil (United States Publication No. 2004/0141548), claims 8, 17, 18 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Admitted Art in view of Shattil and further in view of Joo (United States Publication No. 2004/0208253), claims 26 and 27 are rejected for the same reasons as claims 1 and 17, claim 28 is rejected for the same reasons as claim 14, claims 29-34 are rejected for the same reasons as claims 17 and 14, and claims 9 and 19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Admitted Art in view of Shattil and further in view of well know prior art (MPEP 2144.03). Claim 10 was objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

Claims 1, 2, 4, 7, 8, 14, 17, 20-22, 25, 26, 29, and 31-34 are being appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the non-final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a method for transmitting one or more symbols in a multiple antenna wireless communication system (FIG. 1: 100), the method comprising the step of:

diagonally loading subcarriers from the one or more symbols across a plurality of antennas (FIG. 1: 110) in the multiple antenna wireless communication system (FIGS. 4-7; page 5, line 17, to page 6, line 4).

Claims 2 and 22 requires wherein the one or more symbols are long training symbols based on a single-antenna long training symbol and wherein each subsequent subcarrier from the single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna (FIGS. 4-7; page 5, line 17, to page 6, line 4).

Claim 4 requires wherein the one or more symbols are short training symbols based on a single-antenna short training symbol and wherein each subsequent subcarrier from the single-antenna short training symbol is positioned in a short training symbol for a logically adjacent antenna (page 5, lines 23-26).

Claim 7 requires inserting one or more additional subcarriers in at least one of the plurality of symbols (FIGS. 5 and 6; page 6, line 16, to page 7, line 28; and page 8, lines 4-27).

Claim 8 requires where the one or more additional subcarriers are inserted to ensure that any subcarrier that was nulled by the diagonal loading is surrounded by subcarriers that are not nulled (FIGS. 5 and 6; page 6, line 16, to page 7, line 28; and page 8, lines 4-27).

Claim 20 requires wherein a reduced number of subcarriers are inserted in the at least one of the plurality of long training symbols and wherein a first long training symbol and a second long training symbol are interchanged to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier (FIG. 6; page 8, lines 4-27).

Claims 14 and 25 require diagonally loading a remainder of a header of a packet across the logically adjacent antennas; and diagonally loading data sequences of the packet across the logically adjacent antennas (page 9, lines 16-23).

Independent claim 17 is directed to a method for generating a plurality of long training symbols in a multiple antenna wireless communication system (FIG. 1: 100; page 4, line 28, to page 5, line 26), the method comprising the step of:

diagonally loading subcarriers from a single-antenna long training symbol across long training symbols associated with logically adjacent antennas in the multiple antenna wireless communication system (FIGS. 4-7; page 5, line 17, to page 6, line 4);

nulling subcarriers in the plurality of long training symbols that are not diagonally loaded (FIGS. 4-7; page 5, line 17, to page 6, line 4); and

inserting at least one additional subcarrier to ensure that a nulled subcarrier has at least one subcarrier located on each side of the nulled subcarrier (FIGS. 5 and 6; page 6, line 16, to page 7, line 28; and page 8, lines 4-27).

Independent claim 21 is directed to a transmitter in a multiple antenna wireless communication system (FIG. 1: 100), comprising:

a plurality of transmit antennas (FIG. 1: 110), wherein subcarriers of one or more symbols are diagonally loaded across logically adjacent antennas (FIGS. 4-7; page 5, line 17, to

page 6, line 4).

Independent claim 26 is directed to a method for transmitting one or more symbols in a multiple antenna wireless communication system (FIG. 1: 100), the method comprising the step of:

transmitting subcarriers from the one or more symbols using a plurality of antennas (FIG. 1: 110) in the multiple antenna wireless communication system such that each of the subcarriers are active on only one of the plurality of antennas at a given time (FIGS. 4-7; page 5, line 17, to page 6, line 4).

Independent claim 29 is directed to a transmitter in a multiple antenna wireless communication system (FIG. 1: 100), comprising:

a plurality of transmit antennas (FIG. 1: 110) for transmitting subcarriers from one or more symbols such that each of the subcarriers are active on only one of the plurality of antennas at a given time (FIGS. 4-7; page 5, line 17, to page 6, line 4).

Independent claim 31 is directed to a method for receiving one or more symbols on at least one receive antenna (FIG. 1: 115) transmitted by a transmitter having a plurality of transmit antennas (FIG. 1: 110) in a multiple antenna wireless communication system (FIG. 1: 100; FIG. 12; page 14, lines 11-20), the method comprising the step of:

aggregating subcarriers from the one or more symbols that were transmitted such that each of the subcarriers are active on only one of the plurality of antennas at a given time (FIGS. 4-7; page 5, line 17, to page 6, line 4).

Claims 32 and 34 require wherein said subcarriers are diagonally loaded across said plurality of antennas (FIGS. 4-7; page 5, line 17, to page 6, line 4).

Independent claim 33 is directed to a receiver (FIG. 12: 1200) in a multiple antenna wireless communication system (FIG. 1: 100) having at least one transmitter having a plurality of transmit antennas (FIG. 1: 110), comprising:

at least one receive antenna (FIG. 1: 115); and

an aggregator for aggregating subcarriers from one or more symbols that were transmitted such that each of the subcarriers are active on only one of the plurality of antennas (FIG. 1: 110) at a given time (FIGS. 4-7; page 5, line 17, to page 6, line 4; FIG. 12; page 14, line 18, to page 15, line 20).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-7, 11-16 and 21-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Applicant's Background Disclosure in the Specification, particularly Figures 1-3 and page 4, line 18 through page 5, line 19 (Admitted Art) in view of Shattil (United States Publication No. 2004/0141548), claims 8, 17, 18 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Admitted Art in view of Shattil and further in view of Joo (United States Publication No. 2004/0208253), claims 26 and 27 are rejected for the same reasons as claims 1 and 17, claim 28 is rejected for the same reasons as claim 14, claims 29-34 are rejected for the same reasons as claims 17 and 14, and claims 9 and 19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Admitted Art in view of Shattil and further in view of well know prior art (MPEP 2144.03).

ARGUMENT

Independent claims 1, 17, 21, 26, 29, and 31-34

Independent claims 1, 21, 26, 29, and 31-34 were rejected under 35 U.S.C. §103(a) as being unpatentable over Applicant's Background Disclosure in the Specification, particularly Figures 1-3 and page 4, line 18 through page 5, line 19 (Admitted Art) in view of Shattil, and independent claims 8, 17, 18, 20, 26, 29, and 31-34 were rejected under 35 U.S.C. §103(a) as being unpatentable over Admitted Art in view of Shattil and further in view of Joo. Regarding claim 1, the Examiner acknowledges that the Admitted Art does not specifically disclose that the symbols are loaded diagonally, but asserts that Shattil discloses that symbols are loaded into subcarriers diagonally (FIG. 9A and paragraph 0163).

Applicants note that, in the text cited by the Examiner, Shattil teaches:

> [0163] FIG. 9A illustrates a distribution of sub-carrier weights w_n over a plurality of frequency-time channels. In particular, the sub-carrier weights w.sub.n are interleaved in time, such as to further reduce impulse noise or compensate for quickly varying channel and/or interference conditions. In FIG. 9B, weights are applied to time-frequency channels in a digital-chirp (i.e., frequency ramp) format. In FIG. 9C, sub-carrier weights may share the same time slots.

Shattil teaches a distribution of *sub-carrier weights* w_n. The distribution is over *frequency-time channels*. The rows and columns of FIG. 9A represent *frequency* and *time*, respectively; neither the rows nor the columns of FIG. 9A represent *different antennas*. Shattil does *not* disclose or suggest *diagonally loading subcarriers from one or more symbols* and does

not disclose or suggest *diagonally loading across a plurality of antennas* in a multiple antenna wireless communication system. Independent claims 1 and 21 require *diagonally loading subcarriers from said one or more symbols across a plurality of antennas* in said multiple antenna wireless communication system. Independent claim 17 requires *diagonally loading subcarriers from a single-antenna long training symbol across long training symbols associated with logically adjacent antennas* in said multiple antenna wireless communication system; nulling subcarriers in said plurality of long training symbols that are not diagonally loaded; and inserting at least one additional subcarrier to ensure that a nulled subcarrier has at least one subcarrier located on each side of said nulled subcarrier. Independent claims 26 and 29 require transmitting subcarriers from said one or more symbols using a plurality of antennas in said multiple antenna wireless communication system *such that each of said subcarriers are active on only one of said plurality of antennas at a given time*. Independent claims 31 and 33 require aggregating subcarriers from said one or more symbols that were transmitted such that *each of said subcarriers are active on only one of said plurality of antennas at a given time*. Claims 32 and 34 require *wherein said subcarriers are diagonally loaded across said plurality of antennas*.

Thus, the Admitted Art and Shattil, alone or in combination, do not disclose or suggest diagonally loading subcarriers from said one or more symbols across a plurality of antennas in said multiple antenna wireless communication system, as required by independent claims 1 and 21, do not disclose or suggest diagonally loading subcarriers from a single-antenna long training symbol across long training symbols associated with logically adjacent antennas in said multiple antenna wireless communication system; nulling subcarriers in said plurality of long training symbols that are not diagonally loaded; and inserting at least one additional subcarrier to ensure that a nulled subcarrier has at least one subcarrier located on each side of said nulled subcarrier, as required by independent claim 17, do not disclose or suggest transmitting subcarriers from said one or more symbols using a plurality of antennas in said multiple antenna wireless communication system such that each of said subcarriers are active on only one of said plurality of antennas at a given time, as required by independent claims 26 and 29, do not disclose or suggest aggregating subcarriers from said one or more symbols that were transmitted such that each of said subcarriers are active on only one of said plurality of antennas at a given time, as required by independent claims 31 and 33, and do not disclose or suggest

wherein said subcarriers are diagonally loaded across said plurality of antennas, as required by claims 32 and 34.

Claims 2 and 22

Claims 2 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Admitted Art in view of Shattil. Regarding claim 2, the Examiner asserts that the combination of the Admitted Art and Shattil discloses wherein said one or more symbols are long training symbols based on a single-antenna long training symbol and wherein each subsequent subcarrier from said single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna (the diagonal loading of symbols in Shattil implies that each subsequent subcarrier from said single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna).

As noted above, Shattil teaches:

> [0163] FIG. 9A illustrates a distribution of sub-carrier weights w_n over a plurality of frequency-time channels. In particular, the sub-carrier weights w.sub.n are interleaved in time, such as to further reduce impulse noise or compensate for quickly varying channel and/or interference conditions. In FIG. 9B, weights are applied to time-frequency channels in a digital-chirp (i.e., frequency ramp) format. In FIG. 9C, sub-carrier weights may share the same time slots.

Shattil teaches a distribution of *sub-carrier weights* w_n. The distribution is over *frequency-time channels*. The rows and columns of FIG. 9A represent *frequency* and *time*, respectively; neither the rows nor the columns of FIG. 9A represent *different antennas*. Shattil does *not* disclose or suggest *wherein each subsequent subcarrier from a single-antenna long training symbol is positioned in a long training symbol for a* ***logically adjacent antenna***. Claims 2 and 22 requires *wherein said one or more symbols are long training symbols based on a single-antenna long training symbol and wherein each subsequent subcarrier from said single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna.*

Thus, the Admitted Art and Shattil, alone or in combination, do not disclose or suggest wherein said one or more symbols are long training symbols based on a single-antenna long training symbol and wherein each subsequent subcarrier from said single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna, as required by claims 2 and 22.

Claim 4

Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over the Admitted Art in view of Shattil. Regarding claim 4, the Examiner asserts that the combination of the Admitted Art and Shattil discloses wherein said one or more symbols are short training symbols based on a single-antenna short training symbol and wherein each subsequent subcarrier from said single-antenna short training symbol is positioned in a short training symbol for a logically adjacent antenna (Admitted Art: FIG. 3 and page 5, lines 5-10, "short training symbols").

As the Examiner notes, the Admitted Art discloses short training symbols (page 5, lines 5-10); the Admitted Art does *not* disclose or suggest *wherein each subsequent subcarrier from a single-antenna short training symbol is positioned in a short training symbol for a* ***logically adjacent antenna***. Moreover, as noted above, Shattil teaches a distribution of *sub-carrier weights* w_n. The distribution is over *frequency-time channels*. The rows and columns of FIG. 9A represent *frequency* and *time*, respectively; neither the rows nor the columns of FIG. 9A represent *different antennas*. Shattil does *not* disclose or suggest *wherein each subsequent subcarrier from a single-antenna short training symbol is positioned in a short training symbol for a* ***logically adjacent antenna***. Claim 4 requires *wherein said one or more symbols are short training symbols based on a single-antenna short training symbol and wherein each subsequent subcarrier from said single-antenna short training symbol is positioned in a short training symbol for a logically adjacent antenna.*

Thus, the Admitted Art and Shattil, alone or in combination, do not disclose or suggest wherein said one or more symbols are short training symbols based on a single-antenna short training symbol and wherein each subsequent subcarrier from said single-antenna short training symbol is positioned in a short training symbol for a logically adjacent antenna, as required by claim 4.

Claims 7

Claim 7 was rejected under 35 U.S.C. §103(a) as being unpatentable over the Admitted Art in view of Shattil. Regarding claim 7, the Examiner asserts that the combination of the Admitted Art and Shattil discloses inserting one or more additional subcarriers in at least one of said plurality of symbols (Admitted Art: page 4, line 20, to page 5, line 10: inserting additional subcarriers is inherent in OFDM).

In the text cited by the Examiner, the Admitted Art teaches that "only 52 of the 64 subcarriers in the long training symbol are modulated." (Page 4, line 20, to page 5, line 10.) The Admitted Art does *not* disclose or suggest *inserting one or more additional subcarriers in at least one of a plurality of symbols*. Claim 7 requires inserting one or more additional subcarriers in at least one of said plurality of symbols.

Thus, the Admitted Art and Shattil, alone or in combination, do not disclose or suggest inserting one or more additional subcarriers in at least one of said plurality of symbols, as required by claim 7.

Claim 8

Claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over the Admitted Art in view of Shattil, and further in view of Joo. In particular, the Examiner asserts that Joo discloses nulling subcarriers that are not diagonally loaded and inserting non-nulled subcarriers adjacent to nulled subcarriers (abstract and paragraph 25).

In the text cited by the Examiner, Joo teaches that "*a sub-carrier selection and frequency mask unit maps a second number of ARM code components to a second number of sub-carriers among a third number of OFDM sub-carriers distributed equally in a frequency band and maps null components to sub-carriers excluded from the second number of sub-carriers*" (paragraph [0025]); Joo does *not* disclose or suggest where one or more additional subcarriers are inserted to ensure that any subcarrier that was nulled by diagonal loading is surrounded by subcarriers that are not nulled. Claim 8 requires where said one or more additional subcarriers are inserted to ensure that any subcarrier that was nulled by said diagonal loading is surrounded by subcarriers that are not nulled.

Thus, the Admitted Art, Shattil and Joo, alone or in combination, do not disclose or suggest where said one or more additional subcarriers are inserted to ensure that any subcarrier that was nulled by said diagonal loading is surrounded by subcarriers that are not nulled, as required by claim 8.

Claim 20

Claim 20 was rejected under 35 U.S.C. §103(a) as being unpatentable over the Admitted Art in view of Shattil and further in view of Joo. Regarding claim 20, the Examiner asserts that the combination of the Admitted Art, Shattil and Joo discloses wherein a reduced number of subcarriers are inserted in said at least one of said plurality of long training symbols

and wherein a first long training symbol and a second long training symbol are interchanged to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier (citing paragraph [0025] of Joo).

In the text cited by the Examiner, Joo teaches that "*a sub-carrier selection and frequency mask unit maps a second number of ARM code components to a second number of sub-carriers among a third number of OFDM sub-carriers distributed equally in a frequency band and maps null components to sub-carriers excluded from the second number of sub-carriers*" (paragraph [0025]); Joo does *not* disclose or suggest *wherein a reduced number of subcarriers are inserted in at least one of a plurality of long training symbols* and *wherein a first long training symbol and a second long training symbol are* ***interchanged*** *to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier*. Claim 20 requires *wherein a reduced number of subcarriers are inserted in said at least one of said plurality of long training symbols and wherein a first long training symbol and a second long training symbol are interchanged to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier.*

Thus, the Admitted Art, Shattil and Joo, alone or in combination, do not disclose or suggest wherein a reduced number of subcarriers are inserted in said at least one of said plurality of long training symbols and wherein a first long training symbol and a second long training symbol are interchanged to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier, as required by claim 20.

Claims 14 and 25

Claims 14 and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Admitted Art in view of Shattil. Regarding claim 14, the Examiner asserts that the combination of the Admitted Art and Shattil discloses diagonally loading a remainder of a header of a packet across said logically adjacent antennas; and diagonally loading data sequences of said packet across said logically adjacent antennas (FIGS. 1-3; page 4, line 20, to page 5, line 18).

As noted above, Shattil teaches a distribution of *sub-carrier weights* w_n. The distribution is over *frequency-time channels*. The rows and columns of FIG. 9A represent *frequency* and *time*, respectively; neither the rows nor the columns of FIG. 9A represent *different antennas*. Shattil does *not* disclose or suggest *diagonally loading a remainder of a header of a packet across logically adjacent antennas*; and does *not* disclose or suggest *diagonally loading*

data sequences of a packet across logically adjacent antennas. Claims 14 and 25 require diagonally loading a remainder of a header of a packet across said logically adjacent antennas; and diagonally loading data sequences of said packet across said logically adjacent antennas.

Thus, the Admitted Art and Shattil, alone or in combination, do not disclose or suggest diagonally loading a remainder of a header of a packet across said logically adjacent antennas; and diagonally loading data sequences of said packet across said logically adjacent antennas, as required by claims 14 and 25.

Conclusion

The rejections of the cited claims under section 103 in view of Shattil, Joo, the Admitted Art, and the well know prior art, alone or in any combination, are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

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CLAIMS APPENDIX

1. A method for transmitting one or more symbols in a multiple antenna wireless communication system, said method comprising the step of:

diagonally loading subcarriers from said one or more symbols across a plurality of antennas in said multiple antenna wireless communication system.

2. The method of claim 1, wherein said one or more symbols are long training symbols based on a single-antenna long training symbol and wherein each subsequent subcarrier from said single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna.

3. The method of claim 2, wherein said single-antenna long training symbol is an 802.11 a/g long training symbol.

4. The method of claim 1, wherein said one or more symbols are short training symbols based on a single-antenna short training symbol and wherein each subsequent subcarrier from said single-antenna short training symbol is positioned in a short training symbol for a logically adjacent antenna.

5. The method of claim 4, wherein said single-antenna short training symbol is an 802.11 a/g short training symbol.

6. The method of claim 1, wherein said multiple antenna wireless communication system is a MIMO-OFDM system.

7. The method of claim 1, further comprising the step of inserting one or more additional subcarriers in at least one of said plurality of symbols.

8. The method of claim 7, where said one or more additional subcarriers are inserted to ensure that any subcarrier that was nulled by said diagonal loading is surrounded by

subcarriers that are not nulled.

9. The method of claim 7, where said one or more additional subcarriers allow nulled subcarriers to be estimated using an interpolation-based channel estimation technique.

10. The method of claim 2, wherein a reduced number of subcarriers are inserted in said at least one of said plurality of long training symbols and wherein a first long training symbol and a second long training symbol are interchanged to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier.

11. The method of claim 1, wherein said one or more symbols are a SIGNAL-field symbol.

12. The method of claim 11, wherein said SIGNAL-field symbol includes a system type indicator.

13. The method of claim 2, wherein a number of said long training symbols is a function of the number of transmitters.

14. The method of claim 1, further comprising the steps of:

diagonally loading a remainder of a header of a packet across said logically adjacent antennas; and

diagonally loading data sequences of said packet across said logically adjacent antennas.

15. The method of claim 1, wherein said plurality of antennas are logically adjacent.

16. The method of claim 1, whereby a lower order receiver can interpret said transmitted diagonally loaded symbols as a normal OFDM frame.

17. A method for generating a plurality of long training symbols in a multiple antenna wireless communication system, said method comprising the step of:

diagonally loading subcarriers from a single-antenna long training symbol across long training symbols associated with logically adjacent antennas in said multiple antenna wireless communication system;

nulling subcarriers in said plurality of long training symbols that are not diagonally loaded; and

inserting at least one additional subcarrier to ensure that a nulled subcarrier has at least one subcarrier located on each side of said nulled subcarrier.

18. The method of claim 17, wherein said single-antenna long training symbol is an 802.11 a/g long training symbol.

19. The method of claim 17, where said at least one additional subcarrier allows nulled subcarriers to be estimated using an interpolation-based channel estimation technique.

20. The method of claim 17, wherein a reduced number of subcarriers are inserted in at least one of said plurality of long training symbols and wherein a first long training symbol and a second long training symbol are interchanged to position at least one non-nulled subcarrier on at least one side of a nulled subcarrier.

21. A transmitter in a multiple antenna wireless communication system, comprising:

a plurality of transmit antennas, wherein subcarriers of one or more symbols are diagonally loaded across logically adjacent antennas.

22. The transmitter of claim 21, wherein said one or more symbols are long training symbols based on a single-antenna long training symbol and wherein each subsequent subcarrier from said single-antenna long training symbol is positioned in a long training symbol for a logically adjacent antenna.

23. The transmitter of claim 21, wherein said multiple antenna wireless communication system is a MIMO-OFDM system.

24. The transmitter of claim 21, wherein said one or more symbols are a SIGNAL-field symbol.

25. The transmitter of claim 21, wherein:

a remainder of a header of a packet are diagonally loaded across said logically adjacent antennas; and

data sequences of said packet are diagonally loaded across said logically adjacent antennas.

26. A method for transmitting one or more symbols in a multiple antenna wireless communication system, said method comprising the step of:

transmitting subcarriers from said one or more symbols using a plurality of antennas in said multiple antenna wireless communication system such that each of said subcarriers are active on only one of said plurality of antennas at a given time.

27. The method of claim 26, wherein said transmitting step further comprises the step of diagonally loading said subcarriers across said plurality of antennas.

28. The method of claim 26, wherein said plurality of antennas are logically adjacent.

29. A transmitter in a multiple antenna wireless communication system, comprising:

a plurality of transmit antennas for transmitting subcarriers from one or more symbols such that each of said subcarriers are active on only one of said plurality of antennas at a given time.

30. The transmitter of claim 29, wherein said subcarriers are diagonally loaded across said plurality of antennas.

31. A method for receiving one or more symbols on at least one receive antenna transmitted by a transmitter having a plurality of transmit antennas in a multiple antenna wireless communication system, said method comprising the step of:

aggregating subcarriers from said one or more symbols that were transmitted such that each of said subcarriers are active on only one of said plurality of antennas at a given time.

32. The method of claim 31, wherein said subcarriers are diagonally loaded across said plurality of antennas.

33. A receiver in a multiple antenna wireless communication system having at least one transmitter having a plurality of transmit antennas, comprising:

at least one receive antenna; and

an aggregator for aggregating subcarriers from one or more symbols that were transmitted such that each of said subcarriers are active on only one of said plurality of antennas at a given time.

34. The receiver of claim 33, wherein said subcarriers are diagonally loaded across said plurality of antennas.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.